REMARKS

In response to the above-identified Office Action, Applicants amend the application and seek reconsideration thereof. In this response, Applicants withdraw Claims 16-28 and cancel Claim 5. Applicants amend Claim 1 to recite additional patentable features and to incorporate all of the limitations of Claim 5 (now canceled). Applicants also add Claims 29-41. Claim 29 incorporates all of the limitations of Claims 1, 5, 11, and 12. Claim 30 incorporates the limitations of Claim 29 and additional patentable features. Claims 31-41 correspond to Claims 2-4, 6-10, and 13-15. Accordingly, Claims 1-4, 6-15, and 29-41 are pending.

I. Claims Rejected Under 35 U.S.C. § 102

Claims 1-5, 8, 10, 13, and 15 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,396,984 issued to Cho, et al. ("Cho"). Applicant respectfully traverses the rejection.

To anticipate a claim, the Examiner must show that a single reference teaches each of the elements of that claim. Among other elements, Claim 1 as amended recites "an under cladding having a flat shape as a whole placed on a Silicon-On-Insulator (SOI) substrate," "a first core," and "a second core placed on a terminal end portion of said first core and completely covering said terminal end portion." Applicants submit that Cho at least does not teach these elements.

The claimed terminal end portion is defined as the tapered portion at page 11, lines 7-9 of the specification. Applying this definition to the teaching of Cho, there is nothing in the cited passage or anywhere in the disclosure that teaches each of the claimed elements. As shown in Fig. 3, the second core 308 is places on the first core 304 but does not completely cover the terminal end portion of the first core 304. Rather, the disclosed second core 308 only partially covers the top of the terminal end portion of the first core 304. Thus, the structure taught by Cho is patentably distinct from the claimed module.

Additionally, Cho does not disclose that the substrate 300 has a SOI structure. The notion of SOI is totally absent in Cho. Thus, Cho does not teach each of the elements of Claim 1.

The claimed waveguide structure has the advantage of simplifying manufacturing process because of the complete covering of the first core by the second core. The claimed structure may be manufactured using a two-dimensional processing of a plane substrate. In comparison, Cho's mode shape converter requires a complicated three-dimensional processing to realize the shape changes from the upper core to the lower core in the depth dimension. The shape changes require a stop in the etching process which dramatically increases the complexity and difficulty of the manufacturing process. Moreover, the claimed structure allows the use of a low-priced SOI of good quality as the substrate. The materials used to form the first core may be prepared beforehand. Thus, the manufacturing process may be dramatically simplified.

In addition, the rib-type waveguides, as the ones taught by Cho, do not generally have good optical confinement characteristics. As a result, the mode field of the first waveguide cannot be made small. Thus, the rib waveguides can only achieve a single-digit mutual conversion of mode fields (from about 10μm to about 5x4 μm in terms of area). In comparison, the claimed optical module has a significantly larger rate of conversion and stronger optical confinement as compared to the rib-type mode field conversion. For example, Applicants describe in the specification that the mode field of the first waveguide may be reduced to about 0.3 μm. A mode field conversion of about 500 times may be achieved in terms of area (from about 0.3μm to about 7μm). See page 12, lines 4-21 and page 49, lines 1-4 of Applicants' specification. Thus, Applicants' claimed optical module has superior performance as compared to the prior art.

Accordingly, reconsideration and withdrawal of the anticipation rejection of Claim 1 are respectfully requested.

Claim 5 is canceled. In regard to Claims 2-4, 8, 10, 13, and 15, these claims depend from Claim 1 and incorporate the limitations thereof. Thus, at least for the reasons mentioned above in regard to Claim 1, Cho does not anticipate these claims. Accordingly, reconsideration and withdrawal of the anticipation rejection of Claims 2-4, 8, 10, 13, and 15 are respectfully requested.

II. Claims Rejected Under 35 U.S.C. § 103(a)

Claims 6, 7, and 9 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Cho in view of U.S. Publication No. 2003/0044118 applied for by Zhou et al. ("Zhou"). Applicants respectfully traverse the rejection.

To establish a *prima facie* case of obviousness, the Examiner must show the cited references, combined, teach or suggest each of the elements of a claim. Claims 6, 7, and 9 depend from Claim 1 and incorporate the limitations thereof. Thus, for at least the reasons mentioned above in regard to Claim 1, Cho does not teach or suggest each of the elements of these dependent claims.

Zhou does not cure the defect of Cho, at least for the reasons that Zhou fails to mention the existence of a second core at all. Zhou at most discloses a waveguide core 1345, an upper cladding 1350, and an under cladding 1310 (Fig. 13). The Examiner has not identified and Applicants have been unable to discern any portion of Zhou that teaches or suggests the second core. Thus, Cho in view of Zhou does not teach or suggest each of the elements of Claim 1 and its dependent Claims 6, 7, and 9. Accordingly, reconsideration and withdrawal of the obviousness rejection of Claims 6, 7, and 9 are requested.

Claims 11 and 12 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Cho in view of Zhou.

Claims 11 and 12 depend from Claim 1 and incorporate the limitations thereof. Thus, for at least the reasons analogous to those mentioned above in regard to Claims 6, 7, and 9, Cho in view of Zhou does not teach or suggest each of the elements of Claims 11 and 12. Moreover, with

respect to Claim 12, the Examiner relies on paragraph 188 of Zhou for teaching the claimed elements. However, as discussed above, the concept of the second core is totally absent in Zhou. Thus, Zhou cannot possibly teach or suggest the refractive index differences between the second core and the over/under cladding as claimed. Accordingly, reconsideration and withdrawal of the obviousness rejection of Claims 11 and 12 are requested.

Applicants respectfully request consideration of new Claims 29-41 for analogous reasons discussed above. Moreover, the optical module recited in Claim 29 reduces the absorption by the silicon substrate when the mode field is expanded. See Applicants' specification at page 47, lines 7 – page 49, line 4. Thus, the claimed module has the additional advantage of a low loss mode field conversion. Accordingly, consideration and approval of Claims 29-41 are respectfully requested.

CONCLUSION

In view of the foregoing, it is believed that all claims now are now in condition for allowance and such action is earnestly solicited at the earliest possible date. If there are any additional fees due in connection with the filing of this response, please charge those fees to our Deposit Account No. 02-2666. If the Examiner believes that a telephone conference would be useful in moving the application forward to allowance, the Examiner is encouraged to contact the undersigned at (310) 207 3800.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP

Dated: 8/3, 2005

Eric S. Hyman, Reg. No. 30,139

12400 Wilshire Blvd.
Seventh Floor
Los Angeles, California 90025
(310) 207-3800

CERTIFICATE OF MAILING:

I hereby certify that this correspondence is being deposited with the United States Postal Service, with sufficient postage, as first class mail in an envelope addressed to: Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on August 3, 2005.

Tani Teverbaugh — August 3, 2005